

Vaccination against *Salmonella* and the association with measures of *Salmonella* prevalence in live and slaughtered swine - A systematic review.

Denagamage, T.⁽¹⁾, O'Connor, A.^{*(1)}, Sargeant, J.⁽²⁾, Rajic, A.⁽³⁾ and McKean, J.⁽¹⁾

⁽¹⁾Department of Veterinary Diagnostic and Production Animal Medicine, College of Veterinary Medicine, Iowa State University, Ames, 50011, IA, USA.

⁽²⁾Department of Clinical Epidemiology and Biostatistics, McMaster University, 1200 Main St. W., Hamilton, L8N 3Z5, ON, Canada.

⁽³⁾Laboratory for Foodborne Zoonoses, Public Health Agency of Canada, 110 Stone Road W., Guelph, N1G 3W4, ON, Canada.

*corresponding author: oconnor@iastate.edu

Abstract

A systematic review was conducted to evaluate the effectiveness of vaccination to reduce *Salmonella* prevalence in market weight finisher swine. To identify relevant studies, online databases and selected conference proceedings were searched. Two reviewers independently assessed the relevance screening and methodological quality of studies. Data of characteristics of study population, intervention, outcome, statistical analysis, and results were extracted. Four clinical trials and 21 challenge studies were identified for the final review as they described vaccination to reduce *Salmonella* in swine. Present evidence suggests that vaccination is associated with reduced *Salmonella* prevalence in swine.

Introduction

Salmonella is considered one of the major foodborne pathogens transmitted by pork and pork products. Vaccination is considered one method of reducing pre-harvest *Salmonella* prevalence in swine. The aim of this systematic review was to appraise and synthesize studies describing vaccination as a method of reducing *Salmonella* prevalence in market weight finisher swine (Cook et al., 1997; Sargeant et al., 2005).

Materials and Methods

The review question was "What is the association between *Salmonella* prevalence in the ante-mortem or post-mortem animal and vaccination against *Salmonella* in market weight finisher swine?". A comprehensive literature search was conducted on online bibliographic databases. Three major conference proceedings were searched by hand. No language or publication restrictions for the searches were imposed. Inclusion criteria for relevance screening were 1) primary research in English, 2) Ph.D. theses in English, 3) citations from conference proceedings, 4) described evaluation of vaccination against *Salmonella* in swine in a challenge trial or clinical trial, and 5) reported ante-mortem or post-mortem presence of *Salmonella* in swine. The methodological quality of all relevant studies was independently assessed by two reviewers using checklists to assess challenge trials and clinical trials. Methodological grades of low/high were assigned based on the quality criteria. Components of the quality assessment included objectives and study population, intervention, withdrawals and loss to follow-up, outcome assessment, and data analysis. Data extraction included the characteristics of population, intervention and level of allocation to treatment groups, outcome, and results. Only outcomes describing ante-mortem or post-mortem culture of *Salmonella* post-vaccination were extracted.

Results

Four clinical trials and 21 challenge studies that reported vaccination against *Salmonella* in swine were identified for the final review. (Baum et al., 1997; Charles et al., 1999; Charles et al., 2000a; Charles et al., 2000b; Coe et al., 1992; Draayer, 1986; Foster et al., 2003; Gibson et al., 1999; Groninga et al., 2000; Hanna et al., 1979; Kennedy et al., 1999; Kern, 1994; Kolb et al., 2001; Kolb et al., 2002; Kramer et al., 1987; Kramer et al., 1992; Letellier et al., 2000; Lumsden et al., 1991; Maes et al., 2001; Neubauer and Roof, 2005; Roesler et al., 2004b; Roesler et al., 2004a; Roof and Doitchinoff, 1995; Springer et al., 2001). Out of 25 studies, 18 and two studies were conducted in the USA and Canada, respectively, and five studies were conducted in Europe. All four clinical trials reported isolation of *Salmonella* in market weight finisher swine, though received a low methodological quality grade. All the challenge studies were conducted on age less than 15-week-old pigs while four of them received a high methodological quality grade.

Discussion

The majority of studies reported a reduction in *Salmonella* associated with vaccination using a variety of outcomes such as number of *Salmonella* positive pigs or number of *Salmonella* positive environmental samples. Some studies did not provide any data on the outcome effect other than a p value. Most of the studies did not report study features which reduce bias and increase internal validity, i.e. random allocation of treatment units or blinding at outcome assessment. Not all the studies tested for *Salmonella* status prior to the intervention.

Conclusion

The present evidence suggests that vaccination against *Salmonella* is associated with reduced level of *Salmonella* prevalence in finisher swine. However, many of the studies in the review did not include information that would have increased the evidentiary value of the papers in answering the review question.

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